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ABSTRACT

The relationship of the Progressive Matrices Test (PM) to the Lorge-Thorndike Intelligence Test (LTIQ) and the Wechsler Intelligence Scale for Children (WISC) is examined. Predictive power of these measures with respect to a number of achievement measures was also investigated. The initial sample consisted of 242 first graders and 281 second graders; 182 sixth graders constituted a second sample. A breakdown of the sample by sex and ethnic group is given in Tables 2 through 7. Table 1 gives correlations of the PM with the LTIQ and the WISC and its subscales for each grade considered, for all groups combined. Results indicate that the PM is more predictive of verbal abilities for females than for males. For minority children, the scores associated with the PM, the scores associated with the LITQ, and the Wechsler and its subscales, showed a low and erratic relationship, indicating that the PM measures a dimension of intelligence relatively untapped by the other instruments. However, the PM was found to be a poor predictor of reading or arithmetic achievement for the sixth grade Mexican-American sample, but for all other groups it provided substantial prediction in most cases. The LTIQ was found to be far superior to the PM and WISC as a predictor with all groups. (LR)

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RAVEN'S PROGRESSIVE MATRICES TEST CORRELATIONS WITH MEASURES OF LORGE-THORNDIKE AND WECHSLER INTELLIGENCE TESTS

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RAVEN'S PROGRESSIVE MATRICES TEST CORRELATIONS WITH MEASURES OF THE LORGE-THORNDIKE AND WECHSLER INTELLIGENCE TESTS[1]

The Revised Progressive Matrices Tests (1956), a measure of perceptual and intellectual functioning, was used by the Riverside School Study to provide a measure of reasoning capacity reputed to be more culture-fair than those usually administered in school situations. MacArthur and Elley[2] (1963), in a study examining a number of intellectual capacity measures (including Cattell's Culture Free Test) for culture-fairness concluded that of those measures studied Progressive Matrices fulfilled that function best. The measure consists of designs with a piece missing from each. The child is asked to choose the missing piece from among six alternatives.

The purpose of this report is to examine the relationship of the Progressive Matrices Test (PM) to the Lorge-Thorndike Intelligence Test (LTIQ) and the Wechsler Intelligence Scale for Children (WISC). In addition, the predictive power of these measures with respect to a number of achievement measures will be considered.

The sample associated with this study consisted of 242 first grade children and 281 second grade children measured in the Spring of 1967, and 182 sixth grade children of the Riverside School Study sample measured in the Fall of 1967. This sample was chosen due to the fact that no Lorge-Thorndike IQ measurements were available for fourth and fifth graders and the fact that the number of third graders with scores on all three measures of interest was small. Further breakdown of the sample by sex or ethnic group may be seen in Tables 2 through 7.

For all groups combined, correlations of the Progressive Matrices Test with the Lorge-Thorndike Intelligence Test and the Wechsler Intelligence Scale for Children and its subscales for each grade considered are shown in Table 1. Examination of the table suggests a moderate increase in the positive relationship of the Progressive Matrices scores with all scales and subscales considered as the children mature with the exception of the Picture Arrangement subscale where the relationship appears to decrease with maturity, and the Digit Span subscale, where the relationship remains rather constant. This implies a convergence in what is being measured by the Progressive Matrices Test and the other scales and subscales. It may be that

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[1]Funds for this project were granted by the Office of Compensatory Education, California State Department of Education under provisions of the McAteer Act.

[2]R. MacArthur and W. Elley. "The Reduction of Socio-Economic Bias in Intelligence Testing." British Journal of Educational Psychology. 33: 107-119, June, 1963.

the higher error variability associated with younger children dampens the relationship of the Progressive Matrices Test to the other measures in the earlier grades. It may be noted that the Progressive Matrices correlations with the combined measures are not exceptionally large but substantial, sharing at most 36 per cent of variance. Not surprising is the fact that among the combined measures the Progressive Matrices correlate best with the non-verbal subscale of the Lorge-Thorndike Intelligence Test and the performance subscale of the Wechsler Intelligence Scale for Children. It is also seen that among the performance subscales, Block Design and Object Assembly are the Progressive Matrice's closest relatives. More surprising perhaps is the observation that among the verbal subscales of the Wechsler Intelligence Scale for Children, Vocabulary and Information provide the strongest relationship.

TABLE 1

PROGRESSIVE MATRICES CORRELATIONS WITH THE LORGE-THORNDIKE INTELLIGENCE TEST AND THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN, ALL GROUPS COMBINED (1967)

Combined Measures	First Grade (N=242)	Second Grade (N=281)	Sixth Grade (N=182)
LTIQ			
Verbal	. .	. .	.46
Non-Verbal	.35	.49	.56
WISC			
Verbal	.36	.45	.45
Performance	.43	.55	.60
Full	.46	.54	.58
Verbal Subscales			
Information	.30	.42	.42
Comprehension	.18	.19	.27
Arithmetic	.23	.36	.38
Similarities	.30	.37	.38
Vocabulary	.37	.42	.43
Digit Span	.20	.25	.20
Performance Subscales			
Picture Completion	.17	.27	.47
Picture Arrangement	.41	.34	.20
Block Design	.42	.53	.60
Object Assembly	.42	.50	.51
Coding	.08	.19	.32

Correlations for each sex are given in Tables 2 and 3. With the exception of a few subscales, the pattern observed in Table 1 of increasing correlations as the child matures is not apparent among males (Table 2). Among females (Table 3), however, the pattern is strong.

TABLE 2

PROGRESSIVE MATRICES CORRELATIONS
WITH OTHER TESTS FOR MALES

Combined Measures	First Grade (N=125)	Second Grade (N=151)	Sixth Grade (N=90)
Lorge-Thorndike			
Verbal	. .	. .	.39
Non-Verbal	.35	.50	.49
Wechsler Intelligence Scale for Children			
Verbal	.39	.44	.36
Performance	.43	.55	.51
Full	.48	.54	.48
Verbal Subscales			
Information	.34	.42	.37
Comprehension	.22	.20	.13
Arithmetic	.21	.39	.31
Similarities	.31	.41	.35
Vocabulary	.38	.40	.31
Digit Span	.21	.19	.16
Performance Subscales			
Picture Completion	.22	.24	.41
Picture Arrangement	.42	.32	.07
Block Design	.48	.50	.60
Object Assembly	.45	.51	.50
Coding	.05	.19	.12

TABLE 3

PROGRESSIVE MATRICES CORRELATIONS
WITH OTHER TESTS FOR FEMALES

Combined Measures	First Grade (N=117)	Second Grade (N=130)	Sixth Grade (N=92)
Lorge-Thorndike			
Verbal	. .	. .	.61
Non-Verbal	.35	.48	.72
Wechsler Intelligence Scale for Children			
Verbal	.35	.45	.53
Performance	.45	.54	.68
Full	.44	.54	.66
Verbal Subscales			
Information	.26	.42	.47
Comprehension	.12	.16	.38
Arithmetic	.26	.32	.45
Similarities	.30	.35	.44
Vocabulary	.35	.42	.52
Digit Span	.19	.34	.24
Performance Subscales			
Picture Completion	.10	.29	.50
Picture Arrangement	.41	.36	.31
Block Design	.35	.58	.60
Object Assembly	.38	.47	.52
Coding	.13	.16	.54

Examination of Tables 2 and 3 reveals higher correlations for females than for males for the Progressive Matrices with all the other intelligence measures considered. This may be associated with the larger error variability associated generally with male responses. In spite of the cultural stereotype of females as vacillating, unpredictable beings, it has been known for some time that female responses in general are more predictable than the responses of males. Another sex related pattern reveals itself also. For females, the relationship of the Progressive Matrices to the verbal measures is nearly as great as the relationship to the non-verbal measures. For males, however, the relationships of the verbal subscales to the Progressive Matrices are much weaker than the Block Design, Object Assembly, and Picture Completion subscales of performance. Thus, for females the Progressive Matrices are much more predictive of verbal abilities than is true for males.

When the correlations are broken down according to ethnicity (Tables 4, 5 and 6) little is found that is similar. In fact, correlations among the

minority children tend to be low and erratic, the one exception being Block Design. One thing is certain--the relationship of the Progressive Matrices to the measures associatd with the Lorge-Thorndike Intelligence Test and the Wechsler Intelligence Scale for Children differs both for sex and especially ethnicity. The low correlations of the Progressive Matrices with these intelligence tests for minority children suggests they are measuring different dimensions of intelligence. If these instruments are in fact measuring dimensions of intelligence, then we might expect them to substantially predict achievement.

TABLE 4

PROGRESSIVE MATRICES CORRELATIONS WITH
OTHER TESTS FOR MEXICAN-AMERICANS

Combined Measures	First Grade (N=98)	Second Grade (N=95)	Sixth Grade (N=69)
Lorge-Thorndike			
Verbal	. .	. .	.01
Non-Verbal	.21	.49	.08
Wechsler Intelligence Scale for Children			
Verbal	.32	.41	.06
Performance	.35	.44	.29
Full	.38	.45	.19
Verbal Subscales			
Information	.32	.40	.14
Comprehension	.13	.20	-.02
Arithmetic	.25	.24	.01
Similarities	.19	.36	-.03
Vocabulary	.34	.32	.07
Digit Span	.21	.19	.10
Performance Subscales			
Picture Completion	.11	.21	.14
Picture Arrangement	41	.28	-.03
Block Design	.40	.49	.44
Object Assembly	.34	.40	.29
Coding	-.03	.04	.01

TABLE 5

PROGRESSIVE MATRICES CORRELATIONS
WITH OTHER TESTS FOR NEGROES

Combined Measures	First Grade (N=55)	Second Grade (N=73)	Sixth Grade (N=42)
Lorge-Thorndike			
Verbal	..	..	.24
Non-Verbal	.28	.42	.42
Wechsler Intelligence Scale for Children			
Verbal	.24	.10	.19
Performance	.09	.44	.49
Full	.19	.29	.40
Verbal Subscales			
Information	.02	.04	.28
Comprehension	.28	-.02	.02
Arithemtic	-.18	.12	-.11
Similarities	.37	.13	.13
Vocabulary	.37	.06	.34
Digit Span	.09	.11	.16
Performance Subscales			
Picture Completion	.07	.01	.49
Picture Arrangement	.24	.26	.15
Block Design	.07	.45	.44
Object Assembly	.10	.49	.39
Coding	-.17	.05	.12

TABLE 6

PROGRESSIVE MATRICES CORRELATIONS
WITH OTHER TESTS FOR ANGLOS

Combined Measures	First Grade (N=83)	Second Grade (N=113)	Sixth Grade (N=71)
Lorge-Thorndike			
Verbal	. .	. .	.42
Non-Verbal	.23	.32	.61
Wechsler Intelligence Scale for Children			
Verbal	.29	.41	.45
Performance	.54	.51	.54
Full	.47	.52	.58
Verbal Subscales			
Information	.24	.41	.32
Comprehension	.17	.11	.30
Arithmetic	.27	.35	.54
Similarities	.20	.26	.31
Vocabulary	.19	.40	.35
Digit Span	.04	.17	.12
Performance Subscales			
Picture Completion	.08	.31	.43
Picture Arrangement	.34	.20	.15
Block Design	.45	.46	.49
Object Assembly	.52	.40	.45
Coding	.24	.28	.31

Table 7 presents correlation statistics examining the relationship of the various non-verbal intelligence measures of the study to various achievement measures. None of the measures examined in Table 7 occupied a dominant position with respect to achievement prediction in the first or second grades. However, in the sixth grade the Lorge-Thorndike non-verbal subscale dominated prediction of the various forms of achievement considered. This is made apparent by the correlations associated with the sixth grade Lorge-Thorndike non-verbal subscale which are higher in all but two instances (identified in the table by ⟵) than the correlations associated with the Progressive Matrices and the Wechsler Intelligence Scale for Children performance subscale.

This advantage is accentuated among the minority as the correlations associated with the non-verbal Lorge-Thorndike indicate a moderately strong relationship with achievement while the other two measures show a relationship substantially lower. This is particularly apparent in comparing the Progressive Matrices correlations with the non-verbal Lorge-Thorndike for the sixth grade Mexican-Americans. The predictive ability of the Progressive Matrices for the sixth grade Mexican-Americans of this study is virtually inconsequential (see ✓in table).

In summary, it may be noted that substantial correlations existed between the Progressive Matrices and the Lorge-Thorndike Intelligence Test and the Wechsler Intelligence Scale for Children for all subgroups combined. When each sex was considered separately, the patterns of association differed. In particular, for girls the Progressive Matrices Test was a better predictor of the measures associated with the Lorge-Thorndike Intelligence Test and the Wechsler Intelligence Scale for Children than it was for boys. This difference was accentuated in the prediction of the verbal subscales. Correlations associated with ethnic groups were also examined. For the minority children, the correlation of scores associated with the Progressive Matrices, and the scores associated with the Lorge-Thorndike, the Wechsler, and the Wechsler subscales indicated a low and erratic relationship. Thus, it seemed for these children, the Progressive Matrices was measuring a dimension of intelligence relatively untapped by the Lorge-Thorndike and the Wechsler. The usefulness of such a dimension was contemplated through the correlations of the various non-verbal intelligence measures with a number of achievement measures.

The examination of the correlations suggested that, for the sixth grade Mexican-American sample, the Progressive Matrices Test is nearly useless as a predictor of "reading" or "arithmetic" achievement. For all other groups the Progressive Matrices would provide substantial prediction in most cases; however, the non-verbal Lorge-Thorndike Intelligence Test far outshines the Progressive Matrices and the Wechsler Intelligence Scale for Children in this respect. Furthermore, it does not lose its predictive ability with Mexican-American children.

TABLE 7

NON-VERBAL INTELLIGENCE MEASURES CORRELATED WITH ACHIEVEMENT

	First Grade (N=230)			Second Grade (N=275)			Sixth Grade (N=182)		
	PM	LTIQ	WISC	PM	LTIQ	WISC	PM	LTIQ	WISC
ALL GROUPS COMBINED									
Word Meaning*	.35	.41	.45	.38	.43	.36	.50	.67	.70 ←
Paragraph Meaning*	.30	.35	.36	.47	.51	.48	.53	.72	.70
Total Reading*	.33	.42	.43	.47	.50	.47	.50	.73	.55
Arithmetic Concepts*	. .	. .	. .	. .	. .	. .	.53	.67	.50
Arithmetic Applications*	. .	. .	. .	. .	. .	. .	.57	.76	.73
Arithmetic Computation*	. .	. .	. .	. .	. .	. .	.44	.68	.67
MALES									
Word Meaning	.38	.36	.49	.45	.38	.30	.38	.67	.40
Paragraph Meaning	.33	.39	.40	.51	.46	.42	.45	.74	.50
Total Reading	.40	.42	.50	.53	.45	.41	.44	.74	.48
Arithmetic Concepts	. .	. .	. .	. .	. .	. .	.51	.69	.47
Arithmetic Applications	. .	. .	. .	. .	. .	. .	.49	.77	.49
Arithmetic Computation	. .	. .	. .	. .	. .	. .	.35	.70	.53
FEMALES									
Word Meaning	.34	.46	.42	.33	.49	.45	.64	.66	.61
Paragraph Meaning	.30	.33	.35	.46	.59	.57	.70	.68	.62 ←
Total Reading	.29	.43	.38	.44	.57	.55	.70	.70	.64
Arithmetic Concepts	. .	. .	. .	. .	. .	. .	.58	.66	.53
Arithmetic Applications	. .	. .	. .	. .	. .	. .	.66	.77	.62
Arithmetic Computation	. .	. .	. .	. .	. .	. .	.53	.67	.58
ANGLOS									
Word Meaning	.29	.15	.37	.33	.39	.23	.41	.45	.31
Paragraph Meaning	.29	.15	.36	.41	.43	.40	.50	.63	.41
Total Reading	.26	.20	.37	.43	.43	.36	.48	.58	.38
Arithmetic Concepts	. .	. .	. .	. .	. .	. .	.51	.56	.29
Arithmetic Applications	. .	. .	. .	. .	. .	. .	.53	.70	.40
Arithmetic Computation	. .	. .	. .	. .	. .	. .	.45	.60	.47
MEXICAN-AMERICANS									
Word Meaning	.32	.25	.45	.29	.26	.32	✓.12	.49	.29
Paragraph Meaning	.15	.30	.35	.42	.42	.42	✓.07	.41	.26
Total Reading	.30	.34	.45	.41	.39	.42	✓.10	.50	.31
Arithmetic Concepts	. .	. .	. .	. .	. .	. .	✓.29	.41	.37
Arithmetic Applications	. .	. .	. .	. .	. .	. .	✓.27	.47	.36
Arithmetic Computation	. .	. .	. .	. .	. .	. .	✓.15	.53	.47
NEGROES									
Word Meaning	.19	.46	.32	✓.08	✓.07	✓.10	.38	.53	.34
Paragraph Meaning	.24	.31	.26	✓.19	✓.25	✓.12	.41	.66	.37
Total Reading	.23	.40	.32	✓.17	✓.22	✓.17	.42	.65	.38
Arithmetic Concepts	. .	. .	. .	. .	. .	. .	✓.23	.56	.38
Arithmetic Applications	. .	. .	. .	. .	. .	. .	.31	.68	.38
Arithmetic Computation	. .	. .	. .	. .	. .	. .	✓.05	.50	.24

* Stanford Achievement Test measures

Notes: PM = Progressive Matrices; LTIQ = The non-verbal subscale of the Lorge-Thorndike IQ Test; WISC = The performance subscale of the Wechsler Intelligence Scale for Children